

## PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION  
(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner  
US Department of Commerce  
United States Patent and Trademark  
Office, PCT  
2011 South Clark Place Room  
CP2/5C24  
Arlington, VA 22202  
ETATS-UNIS D'AMERIQUE  
in its capacity as elected Office

Date of mailing (day/month/year) 22 May 2001 (22.05.01)	
International application No. PCT/SE00/01833	Applicant's or agent's file reference TP 1330-WO
International filing date (day/month/year) 21 September 2000 (21.09.00)	Priority date (day/month/year) 22 September 1999 (22.09.99)
Applicant LASSON, Rolf	

1. The designated Office is hereby notified of its election made:

in the demand filed with the International Preliminary Examining Authority on:

19 April 2001 (19.04.01)

in a notice effecting later election filed with the International Bureau on:

\_\_\_\_\_

2. The election  was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombelettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Charlotte ENGER Telephone No.: (41-22) 338.83.38
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## PATENT COOPERATION TREATY

PCT

REC'D 19 DEC 2001

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT PCT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference TP 1330	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/SE00/01833	International filing date (day/month/year) 21.09.2000	Priority date (day/month/year) 22.09.1999
International Patent Classification (IPC) or national classification and IPC7 B 31 B 1/74, B 65 D 5/72		
Applicant Tetra Laval Holdings & Finance SA et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 3 sheets, including this cover sheet.

This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of \_\_\_\_\_ sheets.

3. This report contains indications relating to the following items:

- I  Basis of the report
- II  Priority
- III  Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV  Lack of unity of invention
- V  Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI  Certain documents cited
- VII  Certain defects in the international application
- VIII  Certain observations on the international application

Date of submission of the demand 19.04.2001	Date of completion of this report 06.12.2001
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. 08-667 72 88	Authorized officer Kristina Berggren/Els Telephone No. 08-782 25 00

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## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE00/01833

## I. Basis of the report

## 1. With regard to the elements of the international application:\*

 the international application as originally filed the description:pages \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_ the claims:pages \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, as amended (together with any statement) under article 19  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_ the drawings:pages \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_ the sequence listing part of the description:pages \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_

## 2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language \_\_\_\_\_ which is:

 the language of a translation furnished for the purposes of international search (under Rule 23.1(b)). the language of publication of the international application (under Rule 48.3(b)). the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

## 3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

 contained in the international application in written form. filed together with the international application in computer readable form. furnished subsequently to this Authority in written form. furnished subsequently to this Authority in computer readable form. The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished. The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.4.  The amendments have resulted in the cancellation of: the description, pages \_\_\_\_\_ the claims, Nos. \_\_\_\_\_ the drawings, sheet/fig \_\_\_\_\_5.  This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2 (c)).\*\*

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item I and annexed to this report.

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## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE00/01833

## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

## 1. Statement

Novelty (N)	Claims	2-5, 7	YES
	Claims	1, 6, 8-9	NO
Inventive step (IS)	Claims	2-5	YES
	Claims	1, 6-9	NO
Industrial applicability (IA)	Claims	1-9	YES
	Claims		NO

## 2. Citations and explanations (Rule 70.7)

Relevant documents cited in the International Search report:

(D1): WO, 99043561, A1

(D2): SE, 452 874, B

Document D1 describes a package provided with an emptying hole prepared in the package wall. The package material is made of a paper layer coated with plastic on each side. The emptying hole is made partly through the coated paper in that way the second plastic layer is intact. See page 5, line 17-24 and line 29-33, page 9 line 19-24 and figure 5. The cutting is made with laser. The package material is provided with a separate pouring element on the outside of the package in the area of the prepared emptying hole.

What is known in document D1 corresponds to the invention according to claims 1, 6, 8 and 9.

Therefore, the invention as described in claims 1, 6, 8, and 9 is not novel nor does it involve an inventive step.

To provide the packaging blank with separate pull-off opening strips above the partly provided emptying holes as described in claim 7 is previously known in document D2.

Considering what is previously known from these two documents, it appears to be obvious to a person skilled in the art to provide a method as described in claim 7.

Consequently, the invention according to claim 7 does not involve an inventive step.

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## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>TP 1330-WO</b>	<b>FOR FURTHER ACTION</b>	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
International application No. <b>PCT/SE 00/01833</b>	International filing date ( <i>day/month/year</i> ) <b>21 Sept 2000</b>	(Earliest) Priority Date ( <i>day/month/year</i> ) <b>22 Sept 1999</b>
Applicant <b>Tetra Laval Holdings &amp; Finance SA et al</b>		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report
  - a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 

the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).
  - b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing:
 

contained in the international application in written form.

filed together with the international application in computer readable form.

furnished subsequently to this Authority in written form.

furnished subsequently to this Authority in computer readable form.

the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.
2.  Certain claims were found unsearchable (See Box I).
3.  Unity of invention is lacking (See Box II).
4. With regard to the title,
 

the text is approved as submitted by the applicant.

the text has been established by this Authority to read as follows:
5. With regard to the abstract,
 

the text is approved as submitted by the applicant.

the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. The figure of the drawings to be published with the abstract is Figure No. 5B

as suggested by the applicant.

because the applicant failed to suggest a figure.

because this figure better characterizes the invention.

None of the figures.

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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 00/01833

## A. CLASSIFICATION OF SUBJECT MATTER

**IPC7: B31B 1/74, B65D 5/72**

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

**IPC7: B31B, B65D, B65B, B29C**

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

**SE,DK,FI,NO classes as above**

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 9943561 A1 (SIG COMBIBLOC GMBH), 2 Sept 1999 (02.09.99), page 5, line 17 - line 24; page 5, line 29 - line 33; page 9, line 19 - line 24, figure 5	1,6,8,9
Y		7
A	--	2-5
X	SE 452874 B (AB TETRA PAK), 21 December 1987 (21.12.87), figures 1-2	9
Y	--	7

 Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

Date of mailing of the international search report

13-12-2000

**7 December 2000**Name and mailing address of the ISA/  
Swedish Patent Office  
Box 5055, S-102 42 STOCKHOLM  
Facsimile No. + 46 8 666 02 86

Authorized officer

**Kristina Berggren/Els**  
Telephone No. + 46 8 782 25 00

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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 00/01833

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0234805 A1 (ELOPAK A/S), 2 Sept 1987 (02.09.87), figures 1-2, abstract	9
A	--	1-8
X	EP 0199830 A1 (ELOPAK A/S), 5 November 1986 (05.11.86), figures 1-2, abstract	9
A	--	1-8
X	WO 9814317 A1 (ELOPAK SYSTEMS AG), 9 April 1998 (09.04.98), figures 10,11, abstract	9
A	-----	1-8

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## INTERNATIONAL SEARCH REPORT

Information on patent family members

02/11/00

International application No.

PCT/SE 00/01833

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
WO 9943561 A1	02/09/99	AU 2724599 A		15/09/99
		DE 19807474 A		26/08/99
		DE 29823992 U		16/03/00
SE 452874 B	21/12/87	AT 68147 T		15/10/91
		AU 586922 B		27/07/89
		AU 7171387 A		22/10/87
		CA 1291052 A		22/10/91
		DE 3773526 A		14/11/91
		EP 0242720 A,B		28/10/87
		SE 0242720 T3		
		ES 2026145 T		16/04/92
		JP 1911820 C		09/03/95
		JP 6041295 B		01/06/94
		JP 62260639 A		12/11/87
		SE 8601761 A		18/10/87
		SU 1542409 A		07/02/90
		US 4782646 A		08/11/88
EP 0234805 A1	02/09/87	SE 0234805 T3		
		AT 52209 T		15/05/90
		DE 3762390 D		00/00/00
		NO 158929 B,C		08/08/88
		NO 860644 A		21/08/87
EP 0199830 A1	05/11/86	SE 0199830 T3		
		AT 33235 T		15/04/88
		DE 3562006 D		00/00/00
WO 9814317 A1	09/04/98	AU 4217697 A		24/04/98
		EP 0874725 A		04/11/98
		GB 9620412 D		00/00/00
		ZA 9708773 A		30/03/99



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The demand must be filed directly with the competent International Preliminary Examining Authority or, if two or more Authorities are competent, with the one chosen by the applicant. The full name or two-letter code of that Authority may be indicated by the applicant on the line below:

IPEA/ SE

# PCT

## CHAPTER II

### DEMAND

under Article 31 of the Patent Cooperation Treaty:

The undersigned requests that the international application specified below be the subject of international preliminary examination according to the Patent Cooperation Treaty and hereby elects all eligible States (except where otherwise indicated).

For International Preliminary Examining Authority use only

Identification of IPEA		Date of receipt of DEMAND
Box No. I IDENTIFICATION OF THE INTERNATIONAL APPLICATION		Applicant's or agent's file reference TP 1330
International application No. PCT/SE00/01833	International filing date (day/month/year) 21-09-2000	(Earliest) Priority date (day/month/year) 22 September 1999
Title of invention A method of producing a packaging container provided with an opening arrangement		
Box No. II APPLICANT(S)		
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) TETRA LAVAL HOLDINGS & FINANCE S A Av. Général-Guisan 70 CH-1009 PULLY Switzerland		Telephone No.: 41 217292211 Facsimile No.: 41 217292759 Telex/Teletype No.: 41 21455811
State (that is, country) of nationality: CH		State (that is, country) of residence: Switzerland
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) LASSON, Rolf Rudeboksvägen 307 S-226 55 LUND Sweden		
State (that is, country) of nationality: SE		State (that is, country) of residence: Sweden
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)		
State (that is, country) of nationality:		State (that is, country) of residence:
<input type="checkbox"/> Further applicants are indicated on a continuation sheet.		

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## Box No. III AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The following person is  agent  common representativeand  has been appointed earlier and represents the applicant(s) also for international preliminary examination. is hereby appointed and any earlier appointment of (an) agent(s)/common representative is hereby revoked. is hereby appointed, specifically for the procedure before the International Preliminary Examining Authority, in addition to the agent(s)/common representative appointed earlier.

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

SUNDELL, Håkan  
 AB TETRA PAK  
 Ruben Rausings gata  
 S-221 86 LUND  
 Sweden

Telephone No.:

046-362297

Facsimile No.:

046-137923

Teleprinter No.:

32140 TPLUND S

 Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

## Box No. IV BASIS FOR INTERNATIONAL PRELIMINARY EXAMINATION

Statement concerning amendments:<sup>\*</sup>

1. The applicant wishes the international preliminary examination to start on the basis of:

 the international application as originally filedthe description  as originally filed as amended under Article 34the claims  as originally filed as amended under Article 19 (together with any accompanying statement) as amended under Article 34the drawings  as originally filed as amended under Article 34

2.  The applicant wishes any amendment to the claims under Article 19 to be considered as reversed.

3.  The applicant wishes the start of the international preliminary examination to be postponed until the expiration of 20 months from the priority date unless the International Preliminary Examining Authority receives a copy of any amendments made under Article 19 or a notice from the applicant that he does not wish to make such amendments (Rule 69.1(d)). (This check-box may be marked only where the time limit under Article 19 has not yet expired.)

\* Where no check-box is marked, international preliminary examination will start on the basis of the international application as originally filed or, where a copy of amendments to the claims under Article 19 and/or amendments of the international application under Article 34 are received by the International Preliminary Examining Authority before it has begun to draw up a written opinion or the international preliminary examination report, as so amended.

Language for the purposes of international preliminary examination: English

 which is the language in which the international application was filed. which is the language of a translation furnished for the purposes of international search. which is the language of publication of the international application. which is the language of the translation (to be) furnished for the purposes of international preliminary examination.

## Box No. V ELECTION OF STATES

The applicant hereby elects all eligible States (that is, all States which have been designated and which are bound by Chapter II of the PCT)

excluding the following States which the applicant wishes not to elect:

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## Box No. VI CHECK LIST

The demand is accompanied by the following elements, in the language referred to in Box No. IV, for the purposes of international preliminary examination:

1. translation of international application	:	sheets
2. amendments under Article 34	:	sheets
3. copy (or, where required, translation) of amendments under Article 19	:	sheets
4. copy (or, where required, translation) of statement under Article 19	:	sheets
5. letter	:	sheets
6. other (specify)	:	sheets

For International Preliminary Examining Authority use only

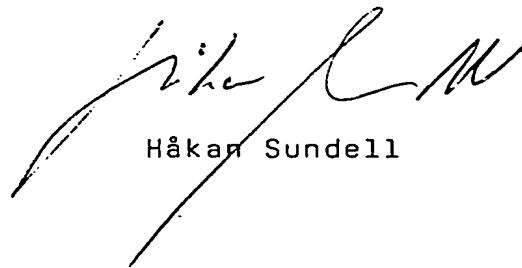
received	not received
<input type="checkbox"/>	<input type="checkbox"/>

The demand is also accompanied by the item(s) marked below:

1. <input checked="" type="checkbox"/> fee calculation sheet	4. <input type="checkbox"/> statement explaining lack of signature
2. <input type="checkbox"/> separate signed power of attorney	5. <input type="checkbox"/> nucleotide and or amino acid sequence listing in computer readable form
3. <input type="checkbox"/> copy of general power of attorney; reference number, if any:	6. <input type="checkbox"/> other (specify):

## Box No. VII SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the demand).



Håkan Sundell

## For International Preliminary Examining Authority use only

1. Date of actual receipt of DEMAND:

2. Adjusted date of receipt of demand due to CORRECTIONS under Rule 60.1(b):

3.  The date of receipt of the demand is AFTER the expiration of 19 months from the priority date and item 4 or 5, below, does not apply.  The applicant has been informed accordingly.

4.  The date of receipt of the demand is WITHIN the period of 19 months from the priority date as extended by virtue of Rule 80.5.

5.  Although the date of receipt of the demand is after the expiration of 19 months from the priority date, the delay in arrival is EXCUSED pursuant to Rule 82.

## For International Bureau use only

Demand received from IPEA on:

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## PCT

## FEE CALCULATION SHEET

## Annex to the Demand for international preliminary examination

International application No. PCT/SE00/01833	For International Preliminary Examining Authority use only																
Applicant's or agent's file reference TP 1330	Date stamp of the IPEA																
<p><b>Applicant</b> TETRA LAVAL HOLDINGS &amp; FINANCE S A</p>																	
<p><b>Calculation of prescribed fees</b></p>																	
1. Preliminary examination fee .....	4.200:- <span style="border: 1px solid black; padding: 2px;">P</span>																
2. Handling fee <i>(Applicants from certain States are entitled to a reduction of 75% of the handling fee. Where the applicant is (or all applicants are) so entitled, the amount to be entered at H is 25% of the handling fee.)</i> .....	1.270:- <span style="border: 1px solid black; padding: 2px;">H</span>																
3. Total of prescribed fees Add the amounts entered at P and H and enter total in the TOTAL box .....	5.470:- <span style="border: 1px solid black; padding: 2px;">TOTAL</span>																
<p><b>Mode of Payment</b></p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%;"><input checked="" type="checkbox"/></td> <td>authorization to charge deposit account with the IPEA (see below)</td> <td style="width: 5%;"><input type="checkbox"/></td> <td>cash</td> </tr> <tr> <td><input type="checkbox"/></td> <td>cheque</td> <td><input type="checkbox"/></td> <td>revenue stamps</td> </tr> <tr> <td><input type="checkbox"/></td> <td>postal money order</td> <td><input type="checkbox"/></td> <td>coupons</td> </tr> <tr> <td><input type="checkbox"/></td> <td>bank draft</td> <td><input type="checkbox"/></td> <td>other (<i>specify</i>):</td> </tr> </table>		<input checked="" type="checkbox"/>	authorization to charge deposit account with the IPEA (see below)	<input type="checkbox"/>	cash	<input type="checkbox"/>	cheque	<input type="checkbox"/>	revenue stamps	<input type="checkbox"/>	postal money order	<input type="checkbox"/>	coupons	<input type="checkbox"/>	bank draft	<input type="checkbox"/>	other ( <i>specify</i> ):
<input checked="" type="checkbox"/>	authorization to charge deposit account with the IPEA (see below)	<input type="checkbox"/>	cash														
<input type="checkbox"/>	cheque	<input type="checkbox"/>	revenue stamps														
<input type="checkbox"/>	postal money order	<input type="checkbox"/>	coupons														
<input type="checkbox"/>	bank draft	<input type="checkbox"/>	other ( <i>specify</i> ):														

Deposit Account Authorization *(this mode of payment may not be available at all IPEAs)*

The IPEA/ SE  is hereby authorized to charge the total fees indicated above to my deposit account.

*(this check-box may be marked only if the conditions for deposit accounts of the IPEA so permit)* is hereby authorized to charge any deficiency or credit any overpayment in the total fees indicated above to my deposit account.

1346

18 April 2001

Deposit Account Number

Date (day/month/year)

Signature

Håkan Sundell

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(19) World Intellectual Property Organization  
International Bureau(43) International Publication Date  
29 March 2001 (29.03.2001)

PCT

(10) International Publication Number  
WO 01/21390 A1

(51) International Patent Classification<sup>7</sup>: B31B 1/74, B65D 5/72 (74) Agent: SUNDELL, Håkan; AB Tetra Pak, Patent Department, Ruben Rausings gata, S-221 86 Lund (SE).

(21) International Application Number: PCT/SE00/01833 (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(22) International Filing Date: 21 September 2000 (21.09.2000) (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data: 9903415-9 22 September 1999 (22.09.1999) SE

(71) Applicant (for all designated States except US): TETRA  
LAVAL HOLDINGS & FINANCE S.A. [CH/CH]; Av.  
Général-Guisan 70, CH-1009 Pully (CH).

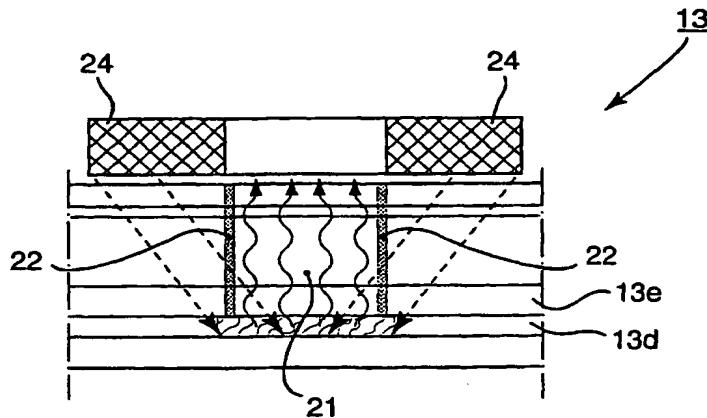
(72) Inventor; and  
(75) Inventor/Applicant (for US only): LASSON, Rolf  
[SE/SE]; Rudeboksvägen 307, S-226 55 Lund (SE).

## Published:

— With international search report.

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: A METHOD OF PRODUCING A PACKAGING CONTAINER PROVIDED WITH AN OPENING ARRANGEMENT



WO 01/21390 A1

(57) Abstract: The disclosure relates to a method of producing packages with opening arrangements and of the type which has a hole prepared in the package wall through which the package is intended to be emptied of its contents. A web of paper or paperboard is coated on its one side with a liquid-tight coating of plastic and, on its other side, with a metal foil which serves as oxygen gas barrier and which is bonded to the paper or paperboard layer by an interjacent adhesive layer. The coated web or packaging blank is thereafter transported further to a packing and filling machine where the web is provided with emptying-preparatory holes before being reformed into finished packages in a conventional manner. The emptying-preparatory holes are made only partly through the web in that the web is first incised or cut along closed lines through the outer plastic coating and the paper or paperboard web down to, but not through, the subjacent metal layer, and the parts of the web enclosed by the incision lines being thereafter removed from the web with the aid of a vacuum. The removal of the above-mentioned web parts is facilitated in that the packaging blank is selectively heated in order wholly or at least partly to break the bond between the metal foil and the paper or paperboard layer within the region of these parts.

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## A METHOD OF PRODUCING A PACKAGING CONTAINER PROVIDED WITH AN OPENING ARRANGEMENT

### TECHNICAL FIELD

5 The present invention relates to a method of producing packages provided with an opening arrangement and of the type which has an emptying hole prepared in the package wall and through which the package is intended to be emptied of its contents, the method comprising the steps of coating one side of a web of paper or paperboard with a liquid-tight coating of plastic, and the other 10 side with a foil or coating of metal which serves as oxygen gas barrier and which, by means of a layer of sealing plastic or other suitable adhesive, is bonded to the paper or paperboard web; of making emptying-preparatory holes in the thus coated paper or paperboard web and thereafter reforming the packaging blank provided with the hole into individual packages provided with an opening 15 arrangement.

### BACKGROUND ART

Within the packaging industry, use is now often made of packages of single-use disposable type for the transport and handling of liquid foods, and a 20 very large group of these so-called single-use disposable packages is produced from a packaging laminate which comprises a paper or paperboard layer and liquid-tight coatings of plastic on both sides of the paper or paperboard layer. Examples of commercial packages of this type are TETRA BRIK® and TETRA REX®.

25 For foods which have a relatively rapid turnover in retail outlets and, as a result, relatively short shelf-life in their package, a packaging laminate solely of paper or paperboard and outer liquid-tight coatings of plastic is often sufficient to impart to the packed food the requisite product protection throughout its entire storage life from filling to consumption. On the other hand, for more perishable 30 and storage-sensitive foods which are intended to be able to be stored for a relatively lengthy period of time in their packages, it is necessary that the packaging laminate be supplemented with at least one additional layer in order to make for extended shelf-life. In particular, it is necessary that the package be

sufficiently tight in order, during the entire storage life of the packed food in its unopened package, to prevent the penetration of oxygen gas which could very rapidly cause deterioration in the food if it came into contact with the food.

5 In order to make for the packing of such perishable, storage- and oxygen gas-sensitive foods with extended shelf life, the packaging laminate is therefore normally supplemented with at least one additional layer of metal or plastic of other type than that employed in the outer plastic coatings of the packaging laminate. The most common packaging laminate for this purpose includes, as the above-mentioned additional layer, an aluminium foil which is 10 practically entirely impermeable to oxygen gas and which, moreover, possesses the advantageous property that it makes possible inductive thermosealing which is a simple, but efficient method of rapidly obtaining mechanically strong and tight sealing joints or seams when the sheet- or web-shaped packaging blank is reformed during the package production operation.

15 In addition to the requisite mechanical and physical properties so as to make for lengthy storage of foods with good shelf life, it is also desirable from the point of view of the consumer that the package can be easy to open when it is time to empty the package of its contents. In order to satisfy this need and provide a conveniently openable package, the package is therefore provided with some type 20 of arrangement which facilitates opening and which may either be integral in or be a separate part of the package.

An extremely well-known and well-functioning opening arrangement includes an emptying hole prepared in the paper or paperboard layer of the package wall and which is closed from inside and outside by respective 25 surrounding layers in the package wall. In order to facilitate exposure of the emptying hole when the package is to be opened, the opening arrangement normally includes a separate opening strip fixedly secured on the outside of the package wall and whose removal entails that the subjacent part of the package wall is entrained and torn off along the incision edges of the hole so that the entire 30 hole is exposed.

Other types of exteriorly applied opening arrangements for facilitating exposure of an emptying hole prepared in the package wall are also known in the art, but since they do not constitute a germane part of the present invention, they

need not be described in greater detail here in order to understand the present invention.

A packaging blank for a packaging container of the type described by way of introduction is produced, according to a conventional method, from a 5 rolled web of paper or paperboard. The rolled web is unwound from the reel and is led through a printing station where the web is provided with the desired decorative artwork and possibly other printing markings relevant for subsequent web operations. The printed web is thereafter led further to a mechanical processing station where the web, in a per se known manner, is given the desired 10 pattern of crease lines and also provided with through-going holes of the desired size and configuration which correspond with the emptying opening of the finished package. From the processing station, the web is thereafter led further to a coating station where the web is coated on both its sides with liquid-tight plastic 15 coatings, and possibly additional layers necessary for the packaging purpose, e.g. an aluminium foil (Alifoil) in that case when the web is later to be used for the production of packages for, for instance, oxygen gas-sensitive products. Finally, from the coating station, the web is wound up on package magazine reels for storage or further transport to a packing machine where the web is supplemented 20 with separate opening details in the areas of the prepared emptying hole, and is thereafter formed, filled and sealed to form individual consumer packages provided with an opening arrangement.

Packages produced according to this conventional method generally function well in those cases when the packaging laminate merely consists of paper or paperboard and outer coatings of plastic, while corresponding packages in 25 which the packaging laminate also includes an aluminium foil show a tendency to lose tightness properties against oxygen gas or right from the outset display deteriorating tightness properties against oxygen gas, in particular within the area of the emptying hole prepared in the package wall. While the packages in most cases maintain sufficient oxygen gas tightness to impart to the packed product 30 satisfactory protection during at least a major part of the storage life of the product in the unopened package, it is naturally a need in the art to be able to produce packages which right from the outset display a high level of oxygen gas tightness

which, moreover, is maintained during the remaining part of the storage life of the product in its package.

According to another conventional method, packaging containers provided with an opening arrangement are produced from a similar packaging blank to that described above, but which, unlike the previous packaging blank, is not provided with any through-going emptying hole before the coating with the additional layer of plastic and aluminium. In this case, the emptying-preparatory holes are made on the ready-coated packaging blank by means of punching tools in connection with the packing and filling machine, whereafter the thus provided holes are closed with the aid of an applicator which applies a sealing plastic patch or strip over the hole before the packaging blank is led in and reformed into packages in the packing and filling machine.

Packages produced according to this conventional method function well also in that case when the packaging laminate includes an aluminium foil, and such packages are moreover conveniently openable, but one serious drawback is that the method requires extremely accurate register maintenance and therefore complicated technical equipment in order to place the emptying holes in the correct position in relation to the printed artwork and crease line pattern of the packaging blank and in order to apply the sealing plastic patch or plastic strip in such a manner that it impenetrably but tightly seals the hole provided in the package wall.

## OBJECTS OF THE INVENTION

One object of the present invention is therefore to provide an indication of how the above-described shortcomings and drawbacks inherent in the prior art technology may be obviated or at least considerably reduced.

A further object of the present invention is to provide a method of producing packaging containers, provided with an opening arrangement, of the type described by way of introduction which, unlike the prior art packaging containers, right from the outset display an oxygen gas tightness which is sufficiently high and stable so as to make possible long-term storage of a perishable, storage- and oxygen gas-sensitive product with good shelf life.

Yet a further object of the present invention is to provide a method of producing packaging containers, provided with an opening arrangement, with increased flexibility for an individual manufacturer of packages.

## 5 SOLUTION

These objects are attained according to the present invention by the method as defined in appended Claim 1.

One key difference between the method according to the present invention and the former method as described above is, thus, that the provision of 10 the emptying hole in the method according to the present invention is to take place on the ready-produced packaging blank, and hence not only on the paper or paperboard web in connection with the production of the packaging blank, as in the prior art conventional method.

One key difference between the method according to the present 15 invention and the second conventional method as described above is further that the emptying holes, in the method according to the present invention, are made only partly through the packaging blank, i.e. from the one side of the packaging blank through the outer plastic coating and the paper or paperboard layer down to, but not through, the subjacent aluminium foil which, thus, together with the outer 20 plastic coating on the other side of the packaging blank, remain unpenetrated or intact on the packaging blank.

As a result of this unique partial hole provision on the finished packaging blank, inter alia the advantage will be afforded that the unruptured or intact aluminium foil (which is nevertheless already present in the packaging 25 blank) can effectively be utilised for oxygen gas-tight closure of the emptying hole which, granted, can but need not be closed separately with an extra plastic strip or plastic patch as in the prior art method.

The deteriorated oxygen gas-tightness in prior art packages provided 30 with opening arrangements of the above-described type, in particular in the region of the emptying opening prepared in the package wall is because of the fact that it has been difficult, for process-related reasons, to achieve a strong internal bonding of the individual layers included in the packaging laminate, i.e. the aluminium foil and the plastic, within this region. When the paper or paperboard web with holes

provided is coated with aluminium foil and plastic, and is, in connection with, or immediately after such coating led through the nip between a press roller and a counter-pressure roller in order, under pressure, to compress and bond the layers to one another, the necessary compression pressure against the web is attained 5 only in those web areas which are not hole-punched, i.e. where the web is wholly continuous, while but a lower (insufficient) pressure is attained in remaining areas of the web, i.e. in the regions of the punched holes.

On the other hand, in the method according to the present invention, where the paper or paperboard web lacks the provision of holes, the same 10 requisite pressure can be attained transversely across the entire web and within all regions of the web.

The partial provision of the emptying-preparatory holes in the well-integrated packaging web according to the present invention may be put into effect mechanically with the aid of punching tools which, at selected points, 15 punch or cut incision lines of the same size and configuration as the desired emptying opening down to a pre-set depth in the packaging web, e.g. down to the aluminium foil beneath the paper or paperboard layer, whereafter the web portions defined by the incision lines (so-called confetti) are removed from the web for the formation of partly provided emptying holes on the upper side of the packaging 20 web.

According to the present invention, the partly provided emptying holes are preferably realised with the aid of laser equipment which directs a cutting laser beam along a line corresponding to the opening configuration of the emptying opening down to the desired depth in the packaging material, i.e. 25 through the plastic coating and the paper or paperboard layer down to the subjacent aluminium foil, from the one side of the packaging web. The advantage in laser cutting as compared with mechanical punching is that laser cutting is mechanically contactless with the moving packaging web and therefore does not involve any moving mechanical components which are worn as a result of 30 physical contact with the moving packaging web or with any other moving machine part. A further major advantage is that a laser beam is easy to direct and set to the desired cutting depth during ongoing processing, without the need to stop the packaging web or otherwise arrest operation.

The parts of the packaging web defined by the incision lines are thereafter removed in a conventional manner by means of vacuum which sucks or draws off these from the packaging web and leaves the partly through-going holes in the packaging web.

5 In order to facilitate this removal by suction or drawing of the confetti from the packaging web, heat is applied to the web simultaneously within the pertinent confetti regions, whereby the sealing plastic or adhesive between the paper or paperboard layer and the aluminium foil is melted and, as a result, the confetti may more easily release its grip on the subjacent aluminium foil.

10 Preferably, the packaging web is heated within the selected regions by induction heating which is an efficient and reliable heating method also at extremely high web speeds.

15 The partly through-going emptying holes in the packaging web can thereafter be sealed with separate opening strips which are fixedly sealed on the one side of the packaging web in a mechanically strong, but rupturable sealing joint around the entire opening contour of the hole. Alternatively, or in addition, the exposed fibre incision edges may be impregnated or covered with a water-repellent coating prior to the application of the opening strips.

According to the present invention, it is further possible, possibly after a preceding impregnation of the exposed fibre incision edges within the regions of the provided emptying holes, to form, fill and seal packages from the hole-provided packaging web and thereafter apply separate, e.g. injection moulded arrangements above each respective emptying hole on each individual package in connection with the package's departing from the packing and filling machine.

25 Such opening arrangements are known to persons skilled in the art and occur in a multiplicity of different variations and, therefore, need not be described in greater detail in this context.

Further advantageous details and characterising features of the present invention will be apparent from the following detailed description with reference 30 to the accompanying Drawings.

Fig. 1 is a block diagram which, in highly simplified form, shows the two main stations 10 and 20 involved for carrying the method according to the present invention into effect, as well as how these two main stations are

interrelated with each other. In the illustrated block diagram in Fig. 1, reference numeral 10 generally refers to a first main station or conversion plant, where sheet- or web-shaped packaging blanks are produced in per se conventional manner and using per se conventional means for further transport to a second 5 main station 20 where the sheet- or web-shaped packaging blanks are, with the aid of packing and filling machines, finally reformed into finished consumer packages. The two main stations 10 and 20 may be in line with each other, but are, in practice, always located at geographically wholly separate sites from one another, as intimated by the broken division line between the two stations.

10 Fig. 2 is a block diagram of the first main station 10 for producing a rolled web-shaped packaging blank with the desired decorative artwork and desired pattern of crease lines facilitating folding. The first main station 10 in the illustrated generic example includes a first processing station 11 and a second processing or coating station 12 which together produce the web-shaped 15 packaging blank from a magazine reel 13' of paper or paperboard shown furthest to the left in Fig. 2.

From the magazine reel 13', a paper or paperboard web 13 is unwound and is led into the first processing station 11 where the web is provided on its one side with the desired decorative artwork of printing ink, and also 20 control- or process markings relevant to subsequent processing operations of the web, at the same time as the web 13 is also provided in a conventional manner with the desired pattern of crease lines which facilitate folding.

From the first processing station 11, the web 13 is led to the second processing station 12 where the web is coated on its one side with plastic, 25 preferably polyethylene, and on its other side with an aluminium foil which serves as gas barrier and which is bonded to the paper or paperboard layer of the web by a layer of sealing plastic or other suitable adhesive applied between the paper or paperboard layer and the aluminium foil. At the same time, the web is coated with at least one additional layer of plastic in order to cover the exposed aluminium foil 30 and produce a web-shaped, oxygen gas- and liquid-tight packaging blank 13 which is thereafter wound up on a finished packaging magazine reel 13".

From the main station 10, possibly after intermediate storage, the finished packaging magazine reel 13" is thereafter transported to the second main

station 20 for the production of packages provided with easily opened opening arrangements.

Fig. 3 is a general block diagram of the second main station 20 which, in the illustrated embodiment, comprises a packing and filling machine 14 of the 5 type which, from a sheet- or web-shaped packaging blank, both forms, fills and seals finished packages 15. The packing and filling machine 14 further displays, at its infeed end, an apparatus 16 for cutting through the packaging blank along a substantially closed line whose size, configuration and placing correspond to the contours and placing of an emptying opening prepared in the finished package.

10 After, or in connection with the apparatus 16, the packing and filling machine moreover displays an apparatus 17 by means of which the parts (the confetti) of the packaging blank defined by the incision lines are removed for the formation of emptying holes which are partly through-going in the packaging blank.

In operation, the web-shaped packaging blank 13 is unwound from the 15 magazine reel 13" placed at the infeed end of the packing and filling machine 14 and is led to the apparatus 16 where the packaging blank is provided with incisions in register with the pre-printed decorative artwork and the crease line pattern of the packaging blank along a substantially closed line which extends from the one side of the packaging blank through the one outer plastic coating and 20 the paper or paperboard layer down to the subjacent aluminium foil. From the apparatus 16, the packaging blank 13 is led further the apparatus 17 where the parts of the packaging blank defined by the incision lines are removed for the formation of partly through-going emptying holes in the packaging blank, before this is led into the packing and filling machine 14 proper for the production of 25 filled, sealed packages 15 with opening arrangements including emptying holes provided in the package wall.

The apparatus 16 for applying emptying-preparatory incision lines in the packaging blank may be a conventional punching tool which is configured and adjusted such that it cuts in incision lines to the desired depth in the passing 30 packaging blank.

According to the present invention, the apparatus 16 is preferably a laser apparatus which directs a laser beam of such intensity and wave length at the packaging blank that the beam cuts through the outer plastic coating and the paper

or paperboard web down to, but not through, the aluminium foil from the one side of the packaging blank. A laser apparatus enjoys the major advantage over a mechanical punching tool that it reliably cuts down to the desired depth in the packaging blank and that, moreover, it can rapidly and readily be switched for 5 cutting incision lines of optional size and configuration, without the process needing to be arrested for this switching operation.

The apparatus 17 for removing the parts of the packaging blank enclosed by the incision lines includes or is connected to a vacuum source with the aid of which the parts are sucked or drawn free from the packaging blank for 10 the formation of emptying holes partly through-going in the packaging blank and which, from the other side of the packaging blank, are closed by the intact or unruptured aluminium foil.

A more reliable and efficient removal by suction or drawing of the confetti is attained according to the present invention if the packaging blank, in 15 connection with the removal operation, is selectively heated within the relevant hole regions in such a manner that the sealing plastic or adhesive between the paper or paperboard layer and the aluminium foil wholly or at least partly melts and the bond between the paper or paperboard layer and the aluminium foil is thereby weakened.

20 Since the packaging blank 13 includes aluminium, the bond-breaking heating may be readily realised by induction heating of the aluminium foil with the aid of conventional induction heater elements which rapidly heat the packaging blank to a temperature corresponding to or slightly exceeding the melting temperature of the relevant sealing plastic.

25 As was described previously, the packing and filling machine 14 may also include an applicator (not shown) in association with or immediately after the confetti-removing apparatus 17 in order to apply a separate opening strip or the like over the exposed end of the partly provided emptying hole. Alternatively, the packing and filling machine 14 may include an apparatus (not shown) for 30 applying a water-repellent impregnation agent for covering and protecting the exposed fibre incision edges within the regions of the above-mentioned emptying holes.

Finally, the packing and filling machine 14 may also be equipped with or connected to an apparatus (not shown) placed at the discharge end of the packing and filling machine and with which separate opening arrangements may be applied on the finished packages over the (possibly covered) emptying holes prepared in the package wall.

Suitable opening arrangements for this purpose are previously known to persons skilled in the art and occur in a multiplicity of different forms and configurations. Each type of such opening arrangement capable of facilitating puncturing and/or removal of the arrangements sealing the hole, including the aluminium foil, may be employed in the present invention.

With reference to Figs. 4 and 5 A-5C, one particularly preferred embodiment of the method according to the present invention will now be described in connection with a packaging blank of a laminated packaging material with the structure which is schematically shown in Fig. 4. The same reference numerals as previously employed have been employed for the same or corresponding components in Figs. 4 and 5. However, in certain cases lower case letters have been added after the reference numeral in order to designate separate parts of the relevant components.

Fig. 4 thus schematically shows a cross section of a sheet- or web-shaped packaging blank of a laminated packaging material carrying the generic reference numeral 13. The packaging blank 13 includes, in this example, a paper or paperboard layer 13a and outer, liquid-tight coatings 13b and 13c on both sides of the paper or paperboard layer 13a. Between the paper or paperboard layer 13a and the one outer plastic coating 13c, the packaging blank has an aluminium foil 13d which serves as oxygen gas barrier and which is bonded to the paper or paperboard layer 13a by means of an interjacent layer 13e of sealing plastic or adhesive of known type. The paper or paperboard layer 13a further has decorative artwork 13f of printing ink which is covered by, but visible through, the outer plastic coating 13b on the other side of the packaging blank 13. While not being particularly shown in Fig. 4, the packaging blank 13 is moreover provided with the desired pattern of crease lines which facilitate folding, and also process-related control markings, so-called bar codes, in register with the printed decorative artwork.

A web-shaped packaging blank 13 with the structure illustrated in Fig. 4 is processed according to the preferred embodiment of the present invention in the manner which is schematically illustrated in Figs. 5A-5C for producing packages provided with opening arrangements of the type which has an emptying hole prepared in the package wall through which the packages are intended to be emptied of their contents.

The web-shaped packaging blank 13 is unwound from a magazine reel 13" placed at the packing and filling machine 14 (Fig. 3), and is led to a laser apparatus 16 which directs a laser beam 20 (Fig. 5A) of adjustable wavelength and intensity at the one side of the passing packaging laminate 13 in order to cut an incision along a line corresponding to the desired opening contour of the emptying hole in the package wall. By the correct setting of the wavelength and intensity of the laser beam 20, the laser beam 20 burns or cuts through the outer plastic coating 13b and the paper or paperboard layer 13a down to, but not through, the subjacent aluminium foil 13d. Such apparatuses equipped with adjustable laser beams are well-known to persons skilled in the art and are not likely to need any detailed description here.

The thus incised packaging blank 13 is thereafter led further to the confetti-removing apparatus 17 (Fig. 3) where those parts 21 of the packaging blank which are defined by the incision lines 22 are removed by suction or drawing off by means of vacuum (schematically illustrated by arrows in Fig. 5C) for the formation of emptying holes 23 partly through-going in the packaging blank 13 and closed from beneath by the intact aluminium foil 13d of the packaging blank 13, including the outer plastic coating 13c.

In order to facilitate and make for a reliable removal of the parts 21 from the packaging blank 13 by suction or drawing, the packaging blank is heated immediately prior to or in connection with this suction or drawing operation, as illustrated in Fig. 5B, by selective induction heating by means of induction heater elements 24 which heat the aluminium foil 13d directly to a suitable temperature for melting or softening the layer 13e of sealing plastic or other suitable adhesive. As a result of this induction heating, moisture present in the packaging blank (moisture content of approx. 5-7%) is forced down towards the aluminium foil,

where the moisture reverses and, by a so-called blistering phenomenon, assists in releasing the confetti fraction 21 from the packaging blank 13.

The combination of laser cutting and removal by suction or drawing during simultaneous heating of the packaging blank within selected areas in the 5 method according to the present invention enjoys the unique advantage that it may be applied on a running packaging web without requiring any complicated extra equipment for guiding the cutting laser beam in register with the pre-printed decorative artwork and the crease lines of the packaging blank. Moreover, it ensures an efficient and rapid processing of the packaging web at the same time as 10 it has an inherent ability to be able to be adapted for accommodating varying types and configurations of emptying holes while in ongoing operation, without the packaging web needing to be stopped or operation otherwise needing to be disrupted for such a switching operation.

It will thus be apparent from the foregoing description that the present 15 invention satisfies the previously established objects and needs and makes for the production of packages provided with emptying arrangements in a simple, efficient manner using existent conventional equipment. While the present invention has been described in particular with reference to a packaging blank including an aluminium foil serving as a gas barrier, the present invention is 20 naturally not restricted exclusively to such packaging blanks. Instead of an aluminium foil, the packaging blank could just as well include a coating of aluminium applied by vacuum deposition. To a person skilled in the art, it will further be obvious that other metals than aluminium may also be employed as gas barrier in the packaging blank, without departing from the inventive concept as 25 this is defined in the appended Claims.

**WHAT IS CLAIMED IS:**

1. A method of producing packages (15) provided with an opening arrangement and of the type which has an emptying hole (23) prepared in the package wall and through which the package is intended to be emptied of its contents, the method comprising the steps of coating one side of a web of paper or paperboard (13a) with a liquid-tight coating (13b) of plastic, and the other side with a foil (13d) or coating of metal which serves as oxygen gas barrier and which, by means of a layer (13e) of sealing plastic or other suitable adhesive, is bonded to the paper or paperboard web; of making emptying-preparatory holes (23) in the thus coated paper or paperboard web and thereafter reforming the packaging blank (13) provided with the holes into individual packages (15) provided with opening arrangements, **characterised in that** the emptying-preparatory holes (23) are made only partly through the coated paper or paperboard web (13) from one side of the web by first cutting or burning incisions (22) in the web along substantially closed lines in correspondence with the size, configuration and placing of each respective emptying hole (23) on the finished packages (15) through the outer plastic coating (13b) and paper or paperboard layer (13a) down to, but not through, the subjacent metal foil (13d) or metal coating, and thereafter removing the parts (21) of the packaging blank located inside the incision lines (22) for the formation of the emptying holes (23) which, from the other side of the web, are still closed by the unruptured or intact metal foil (13d) or coating.
2. The method as claimed in Claim 1, **characterised in that** the parts (21) of the packaging blank (13) located inside the incision lines (22) are sucked or drawn away from the packaging blank with the aid of a vacuum.
3. The method as claimed in Claim 1 or 2, **characterised in that** the packaging blank (13) is heated selectively within the regions of the parts (21) defined by the incision lines (22) immediately prior to and/or in connection with these parts being removed from the packaging blank (13).
4. The method as claimed in Claim 3, **characterised in that** the selective heating of the packaging blank (13) is realised by inductive heating of the metal foil (13d) or coating in the packaging blank.

5. The method as claimed in Claim 3 or 4, **characterised in that** the packaging blank (13) is heated to a temperature at which the layer (13e) of sealing plastic or other adhesive wholly or at least partly melts.
6. The method as claimed in any of the preceding Claims, **characterised in**  
5 **that** the packaging blank (13) is cut by means of laser (20) of adapted wavelength and intensity in order to cut down to, but not through, the metal foil (13d) or metal coating of the packaging blank.
7. The method as claimed in any of the preceding Claims, **characterised in**  
10 **that** the packaging blank (13) is provided with separate pull-off opening strips above the partly provided emptying holes (23), before the packaging blank (13) is reformed into packages (15).
8. The method as claimed in any of Claims 1 to 6, **characterised in that** the produced packages (15) are provided with separate opening arrangements on the outside of the packages in the region of the prepared emptying holes (23).
- 15 9. A package (15) provided with an opening arrangement and of the type which has an emptying hole (23) prepared in the package wall, through which the package is intended to be emptied of its contents, **characterised in that** the package is produced from a packaging material comprising a layer (13a) of paper or paperboard which, on the outside of the package, has a liquid-tight coating  
20 (13b) of plastic and, on the inside of the package, has a metal foil (13d) or coating serving as oxygen gas barrier; and that the emptying hole (23) prepared in the package wall is closed from the inside by the unruptured or intact metal foil (13d) or coating in the packaging material.

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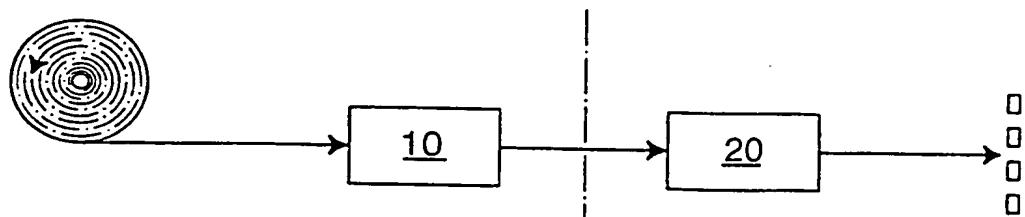


Fig 1

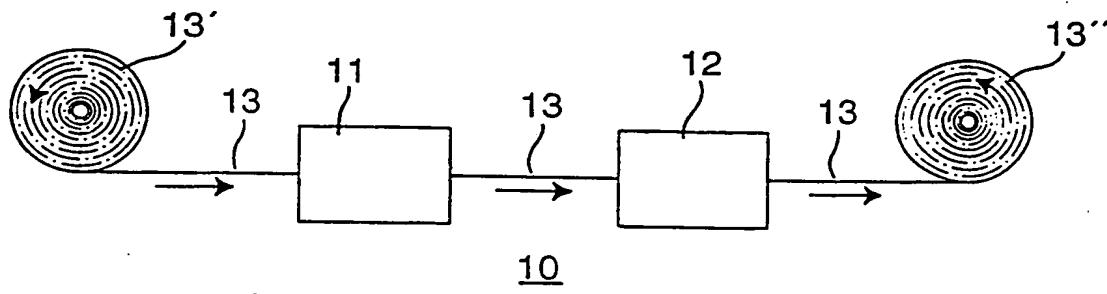


Fig 2

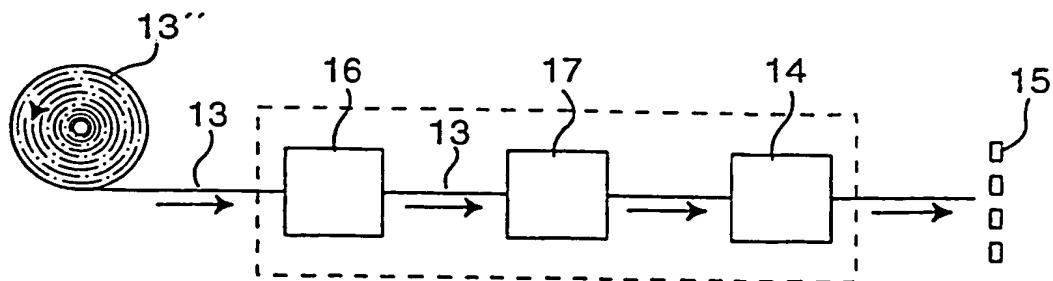


Fig 3

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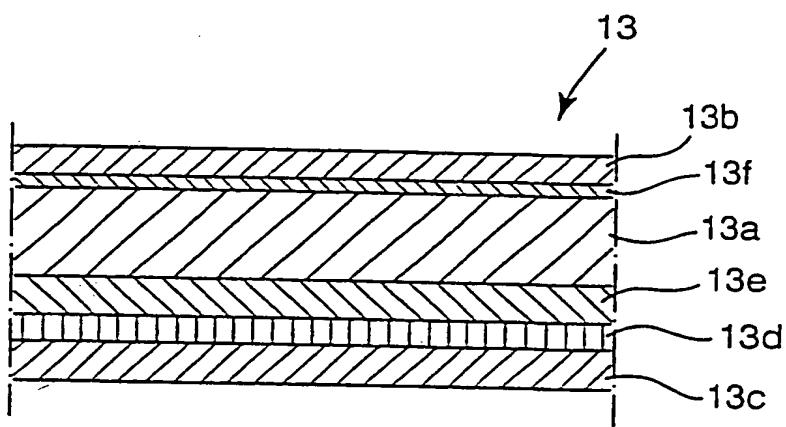


Fig 4

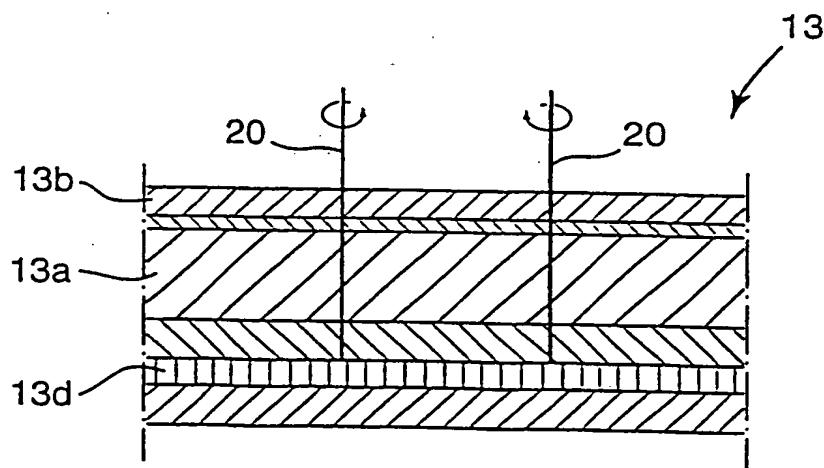


Fig 5A

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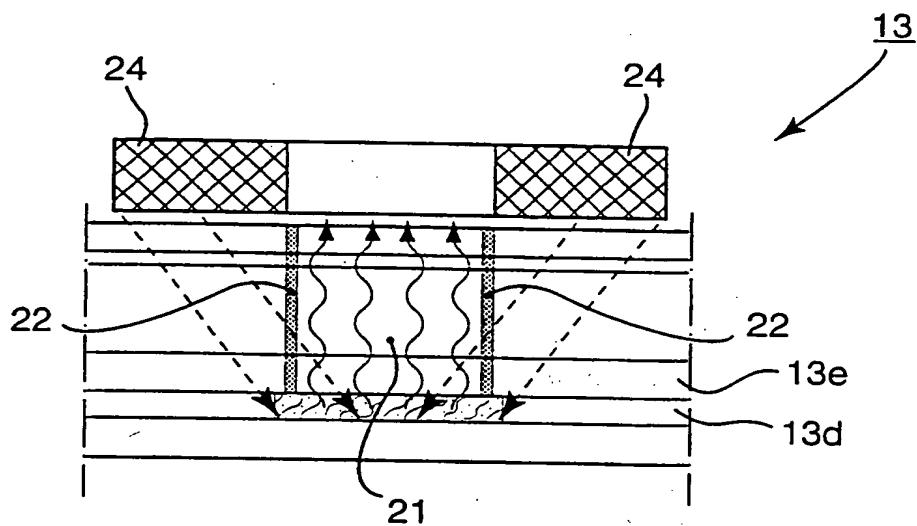


Fig 5B

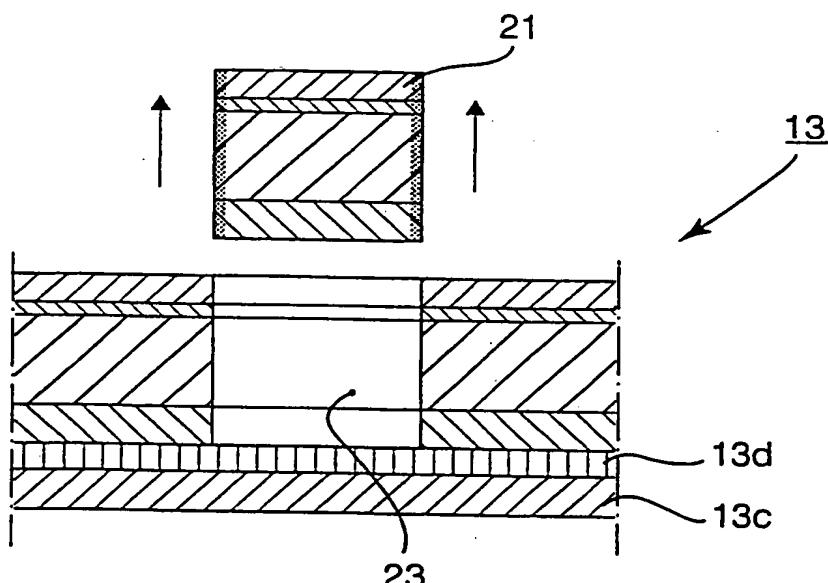


Fig 5C

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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 00/01833

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B31B 1/74, B65D 5/72

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: B31B, B65D, B65B, B29C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 9943561 A1 (SIG COMBIBLOC GMBH), 2 Sept 1999 (02.09.99), page 5, line 17 - line 24; page 5, line 29 - line 33; page 9, line 19 - line 24, figure 5	1,6,8,9
Y		7
A	--	2-5
X	SE 452874 B (AB TETRA PAK), 21 December 1987 (21.12.87), figures 1-2	9
Y	--	7

 Further documents are listed in the continuation of Box C. See patent family annex.

- \* Special categories of cited documents
- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier application or patent but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
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- "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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Date of the actual completion of the international search

7 December 2000

Date of mailing of the international search report

13-12-2000

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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 00/01833

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0234805 A1 (ELOPAK A/S), 2 Sept 1987 (02.09.87), figures 1-2, abstract	9
A	---	1-8
X	EP 0199830 A1 (ELOPAK A/S), 5 November 1986 (05.11.86), figures 1-2, abstract	9
A	---	1-8
X	WO 9814317 A1 (ELOPAK SYSTEMS AG), 9 April 1998 (09.04.98), figures 10,11, abstract	9
A	---	1-8
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**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

International application No.  
**PCT/SE 00/01833**

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9943561 A1	02/09/99	AU 2724599 A DE 19807474 A DE 29823992 U	15/09/99 26/08/99 16/03/00
SE 452874 B	21/12/87	AT 68147 T AU 586922 B AU 7171387 A CA 1291052 A DE 3773526 A EP 0242720 A,B SE 0242720 T3 ES 2026145 T JP 1911820 C JP 6041295 B JP 62260639 A SE 8601761 A SU 1542409 A US 4782646 A	15/10/91 27/07/89 22/10/87 22/10/91 14/11/91 28/10/87 16/04/92 09/03/95 01/06/94 12/11/87 18/10/87 07/02/90 08/11/88
EP 0234805 A1	02/09/87	SE 0234805 T3 AT 52209 T DE 3762390 D NO 158929 B,C NO 860644 A	15/05/90 00/00/00 08/08/88 21/08/87
EP 0199830 A1	05/11/86	SE 0199830 T3 AT 33235 T DE 3562006 D	15/04/88 00/00/00
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## A METHOD OF PRODUCING A PACKAGING CONTAINER PROVIDED WITH AN OPENING ARRANGEMENT

### TECHNICAL FIELD

The present invention relates to a method of producing packages provided with an opening arrangement and of the type which has an emptying hole prepared in the package wall and through which the package is intended to be emptied of its contents, the method comprising the steps of coating one side of a web of paper or paperboard with a liquid-tight coating, of plastic, and the other side with a foil or coating of metal which serves as oxygen gas barrier and which, by means of a layer of sealing plastic or other suitable adhesive, is bonded to the paper or paperboard web; of making emptying-preparatory holes in the thus coated paper or paperboard web and thereafter reforming the packaging blank provided with the hole into individual packages provided with an opening arrangement.

### BACKGROUND ART

Within the packaging industry, use is now often made of packages of single-use disposable type for the transport and handling of liquid foods, and a very large group of these so-called single-use disposable packages is produced from a packaging laminate which comprises a paper or paperboard layer and liquid-tight coatings of plastic on both sides of the paper or paperboard layer.

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Examples of commercial packages of this type are TETRA BRIK® and TETRA REX®.

For foods which have a relatively rapid turnover in retail outlets and, as a result, relatively short shelf-life in their package, a packaging laminate solely of paper or paperboard and outer liquid-tight coatings of plastic is often sufficient to impart to the packed food the requisite product protection throughout its entire storage life from filling to consumption. On the other hand, for more perishable and storage-sensitive foods which are intended to be able to be stored for a relatively lengthy period of time in their packages, it is necessary that the packaging laminate be supplemented with at least one additional layer in order to make for extended shelf-life. In particular, it is necessary that the package be sufficiently tight in order, during the entire storage life of the packed food in its unopened package, to prevent the penetration of oxygen gas which could very rapidly cause deterioration in the food if it came into contact with the food.

In order to make for the packing of such perishable, storage- and oxygen gas-sensitive foods with extended shelf life, the packaging laminate is therefore normally supplemented with at least one additional layer of metal or plastic of other type than that employed in the outer plastic coatings of the packaging laminate. The most common packaging laminate for this purpose includes, as the above-mentioned additional layer, an aluminum foil which is practically entirely impermeable to oxygen gas and which, moreover, possesses the advantageous

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property that it makes possible inductive thermosealing which is a simple, but efficient method of rapidly obtaining mechanically strong and tight sealing joints or seams when the sheet- or web-shaped packaging blank is reformed during the package production operation.

In addition to the requisite mechanical and physical properties so as to make for lengthy storage of foods with good shelf life, it is also desirable from the point of view of the consumer that the package can be easy to open when it is time to empty the package of its contents. In order to satisfy this need and provide a conveniently openable package, the package is therefore provided with some type of arrangement which facilitates opening and which may either be integral in or be a separate part of the package.

An extremely well-known and well-functioning opening arrangement includes an emptying hole prepared in the paper or paperboard layer of the package wall and which is closed from inside and outside by respective surrounding layers in the package wall. In order to facilitate exposure of the emptying hole when the package is to be opened, the opening arrangement normally includes a separate opening strip fixedly secured on the outside of the package wall and whose removal entails that the subjacent part of the package wall is entrained and torn off along the incision edges of the hole so that the entire hole is exposed.

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Other types of exteriorly applied opening arrangements for facilitating exposure of an emptying hole prepared in the package wall are also known in the art, but since they do not constitute a germane part of the present invention, they need not be described in greater detail here in order to understand the present invention.

A packaging blank for a packaging container of the type described by way of introduction is produced, according to a conventional method, from a rolled web of paper or paperboard. The rolled web is unwound from the reel and is led through a printing station where the web is provided with the desired decorative artwork and possibly other printing markings relevant for subsequent web operations. The printed web is thereafter led further to a mechanical processing station where the web, in a per se known manner, is given the desired pattern of crease lines and also provided with through-going holes of the desired size and configuration which correspond with the emptying opening of the finished package. From the processing station, the web is thereafter led further to a coating station where the web is coated on both its sides with liquid-tight plastic coatings, and possibly additional layers necessary for the packaging purpose, e.g. an aluminum foil (Alifoil) in that case when the web is later to be used for the production of packages for, for instance, oxygen gas-sensitive products. Finally, from the coating station, the web is wound up on package magazine reels for storage or further transport to a packing machine where the web is supplemented

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with separate opening details in the areas of the prepared emptying hole, and is thereafter formed, filled and sealed to form individual consumer packages provided with an opening arrangement.

Packages produced according to this conventional method generally function well in those cases when the packaging laminate merely consists of paper or paperboard and outer coatings of plastic, while corresponding packages in which the packaging laminate also includes an aluminum foil show a tendency to lose tightness properties against oxygen gas or right from the outset display deteriorating tightness properties against oxygen gas, in particular within the area of the emptying hole prepared in the package wall. While the packages in most cases maintain sufficient oxygen gas tightness to impart to the packed product satisfactory protection during at least a major part of the storage life of the product in the unopened package, it is naturally a need in the art to be able to produce packages which right from the outset display a high level of oxygen gas tightness which, moreover, is maintained during the remaining part of the storage life of the product in its package.

According to another conventional method, packaging containers provided with an opening arrangement are produced from a similar packaging blank to that described above, but which, unlike the previous packaging blank, is not provided with any through-going emptying hole before the coating with the additional layer of plastic and aluminum. In this case, the emptying-preparatory holes are made on

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the ready-coated packaging blank by means of punching tools in connection with the packing and filling machine, whereafter the thus provided holes are closed with the aid of an applicator which applies a sealing plastic patch or strip over the hole before the packaging blank is led in and reformed into packages in the packing and filling machine.

Packages produced according to this conventional method function well also in that case when the packaging laminate includes an aluminum foil, and such packages are moreover conveniently openable, but one serious drawback is that the method requires extremely accurate register maintenance and therefore complicated technical equipment in order to place the emptying holes in the correct position in relation to the printed artwork and crease line pattern of the packaging blank and in order to apply the sealing plastic patch or plastic strip in such a manner that it impenetrably but tightly seals the hole provided in the package wall.

#### OBJECTS OF THE INVENTION

One object of the present invention is therefore to provide an indication of how the above-described shortcomings and drawbacks inherent in the prior art technology may be obviated or at least considerably reduced.

A further object of the present invention is to provide a method of producing packaging containers, provided with an opening arrangement, of the type described by way of introduction which, unlike the prior art packaging

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containers, right from the outset display an oxygen gas tightness which is sufficiently high and stable so as to make possible long-term storage of a perishable, storage- and oxygen gas-sensitive product with good shelf life.

Yet a further object of the present invention is to provide a method of producing packaging containers, provided with an opening arrangement, with increased flexibility for an individual manufacturer of packages.

## SOLUTION

These objects are attained according to the present invention by the method as defined in appended Claim 1.

One key difference between the method according to the present invention and the former method as described above is, thus, that the provision of the emptying hole in the method according to the present invention is to take place on the ready-produced packaging blank, and hence not only on the paper or paperboard web in connection with the production of the packaging blank, as in the prior art conventional method.

One key difference between the method according to the present invention and the second conventional method as described above is further that the emptying holes, in the method according to the present invention, are made only partly through the packaging blank, i.e. from the one side of the packaging blank through the outer plastic coating and the paper or paperboard layer down to, but

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not through, the subjacent aluminum foil which, thus, together with the outer plastic coating on the other side of the packaging blank, remain unpenetrated or intact on the packaging blank.

As a result of this unique partial hole provision on the finished packaging blank, inter alia the advantage will be afforded that the unruptured or intact aluminum foil (which is nevertheless already present in the packaging blank) can effectively be utilized for oxygen gas-tight closure of the emptying hole which, granted, can but need not be closed separately with an extra plastic strip or plastic patch as in the prior art method.

The deteriorated oxygen gas-tightness in prior art packages provided with opening arrangements of the above-described type, in particular in the region of the emptying opening prepared in the package wall is because of the fact that it has been difficult, for process-related reasons, to achieve a strong internal bonding of the individual layers included in the packaging laminate, i.e. the aluminum foil and the plastic, within this region. When the paper or paperboard web with holes provided is coated with aluminum foil and plastic, and is, in connection with, or immediately after such coating led through the nip between a press roller and a counter-pressure roller in order, under pressure, to compress and bond the layers to one another, the necessary compression pressure against the web is attained only in those web areas which are not hole-punched, i.e. where the web is wholly

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continuous, while but a lower (insufficient) pressure is attained in remaining areas of the web, i.e. in the regions of the punched holes.

On the other hand, in the method according to the present invention, where the paper or paperboard web lacks the provision of holes, the same requisite pressure can be attained transversely across the entire web and within all regions of the web.

The partial provision of the emptying-preparatory holes in the well-integrated packaging web according to the present invention may be put into effect mechanically with the aid of punching tools which, at selected points, punch or cut incision lines of the same size and configuration as the desired emptying opening down to a pre-set depth in the packaging web, e.g. down to the aluminum foil beneath the paper or paperboard layer, whereafter the web portions defined by the incision lines (so-called confetti) are removed from the web for the formation of partly provided emptying holes on the upper side of the packaging web.

According to the present invention, the partly provided emptying holes are preferably realized with the aid of laser equipment which directs a cutting laser beam along a line corresponding to the opening configuration of the emptying opening down to the desired depth in the packaging material, i.e. through the plastic coating, and the paper or paperboard layer down to the subjacent aluminum foil, from the one side of the packaging web. The advantage in laser cutting as compared with mechanical punching is that laser cutting is mechanically

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contactless with the moving packaging web and therefore does not involve any moving mechanical components which are worn as a result of physical contact with the moving packaging web or with any other moving machine part. A further major advantage is that a laser beam is easy to direct and set to the desired cutting depth during ongoing processing, without the need to stop the packaging web or otherwise arrest operation.

The parts of the packaging web defined by the incision lines are thereafter removed in a conventional manner by means of vacuum which sucks or draws off these from the packaging web and leaves the partly through-going holes in the packaging web.

In order to facilitate this removal by suction or drawing of the confetti from the packaging web, heat is applied to the web simultaneously within the pertinent confetti regions, whereby the sealing plastic or adhesive between the paper or paperboard layer and the aluminum foil is melted and, as a result, the confetti may more easily release its grip on the subjacent aluminum foil.

Preferably, the packaging web is heated within the selected regions by induction heating which is an efficient and reliable heating method also at extremely high web speeds.

The partly through-going emptying holes in the packaging web can thereafter be sealed with separate opening strips which are fixedly sealed on the one side of the packaging web in a mechanically strong, but rupturable sealing

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joint around the entire opening contour of the hole. Alternatively, or in addition, the exposed fibre incision edges may be impregnated or covered with a water-repellent coating prior to the application of the opening strips.

According to the present invention, it is further possible, possibly after a preceding impregnation of the exposed fibre incision edges within the regions of the provided emptying holes, to form, fill and seal packages from the hole-provided packaging web and thereafter apply separate, e.g. injection moulded arrangements above each respective emptying hole on each individual package in connection with the package's departing from the packing and filling machine. Such opening arrangements are known to persons skilled in the art and occur in a multiplicity of different variations and, therefore, need not be described in greater detail in this context.

Further advantageous details and characterizing features of the present invention will be apparent from the following detailed description with reference to the accompanying Drawings.

Fig. 1 is a block diagram which, in highly simplified form, shows the two main stations 10 and 20 involved for carrying the method according to the present invention into effect, as well as how these two main stations are interrelated with each other. In the illustrated block diagram in Fig. 1, reference numeral 10 generally refers to a first main station or conversion plant, where sheet- or web-shaped packaging blanks are produced in per se conventional manner and using per

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se conventional means for further transport to a second main station 20 where the sheet- or web-shaped packaging blanks are, with the aid of packing and filling machines, finally reformed into finished consumer packages. The two main stations 10 and 20 may be in line with each other, but are, in practice, always located at geographically wholly separate sites from one another, as intimated by the broken division line between the two stations.

Fig. 2 is a block diagram of the first main station 10 for producing a rolled web-shaped packaging blank with the desired decorative artwork and desired pattern of crease lines facilitating folding. The first main station 10 in the illustrated generic example includes a first processing station 11 and a second processing or coating station 12 which together produce the web-shaped packaging blank from a magazine reel 13' of paper or paperboard shown furthest to the left in Fig. 2.

From the magazine reel 13', a paper or paperboard web 13 is unwound and is led into the first processing station 11 where the web is provided on its one side with the desired decorative artwork of printing ink, and also control- or process markings relevant to subsequent processing operations of the web, at the same time as the web 13 is also provided in a conventional manner with the desired pattern of crease lines which facilitate folding.

From the first processing station 11, the web 13 is led to the second processing station 12 where the web is coated on its one side with plastic,

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preferably polyethylene, and on its other side with an aluminum foil which serves as gas barrier and which is bonded to the paper or paperboard layer of the web by a layer of sealing plastic or other suitable adhesive applied between the paper or paperboard layer and the aluminum foil. At the same time, the web is coated with at least one additional layer of plastic in order to cover the exposed aluminum foil and produce a web-shaped, oxygen gas- and liquid-tight packaging blank 13 which is thereafter wound up on a finished packaging magazine reel 13".

From the main station 10, possibly after intermediate storage, the finished packaging magazine reel 13" is thereafter transported to the second main station 20 for the production of packages provided with easily opened opening arrangements.

Fig. 3 is a general block diagram of the second main station 20 which, in the illustrated embodiment, comprises a packing and filling machine 14 of the type which, from a sheet, or web-shaped packaging blank, both forms, fills and seals finished packages 15. The packing and filling machine 14 further displays, at its infeed end, an apparatus 16 for cutting through the packaging blank along a substantially closed line whose size, configuration and placing correspond to the contours and placing of an emptying opening prepared in the finished package.

After, or in connection with the apparatus 16, the packing and filling machine moreover displays an apparatus 17 by means of which the parts (the confetti) of the packaging blank defined by the incision lines are removed for the formation of emptying holes which are partly through-going in the packaging blank.

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In operation, the web-shaped packaging blank 13 is unwound from the magazine reel 13" placed at the infeed end of the packing and filling machine 14 and is led to the apparatus 16 where the packaging blank is provided with incisions in register with the pre-printed decorative artwork and the crease line pattern of the packaging blank along a substantially closed line which extends from the one side of the packaging blank through the one outer plastic coating and the paper or paperboard layer down to the subjacent aluminum foil. From the apparatus 16, the packaging blank 13 is led further the apparatus 17 where the parts of the packaging blank defined by the incision lines are removed for the formation of partly through-going emptying holes in the packaging blank, before this is led into the packing and filling machine 14 proper for the production of filled, sealed packages 15 with opening arrangements including emptying holes provided in the package wall.

The apparatus 16 for applying emptying-preparatory incision lines in the packaging blank may be a conventional punching tool which is configured and adjusted such that it cuts in incision lines to the desired depth in the passing packaging blank.

According to the present invention, the apparatus 16 is preferably a laser apparatus which directs a laser beam of such intensity and wave length at the packaging blank that the beam cuts through the outer plastic coating and the paper or paperboard web down to, but not through, the aluminum foil from the one side

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of the packaging blank. A laser apparatus enjoys the major advantage over a mechanical punching tool that it reliably cuts down to the desired depth in the packaging blank and that, moreover, it can rapidly and readily be switched for cutting incision lines of optional size and configuration, without the process needing to be arrested for this switching operation.

The apparatus 17 for removing the parts of the packaging blank enclosed by the incision lines includes or is connected to a vacuum source with the aid of which the parts are sucked or drawn free from the packaging blank for the formation of emptying holes partly through-going in the packaging blank and which, from the other side of the packaging blank, are closed by the intact or unruptured aluminum foil.

A more reliable and efficient removal by suction or drawing of the confetti is attained according to the present invention if the packaging blank, in connection with the removal operation, is selectively heated within the relevant hole regions in such a manner that the sealing plastic or adhesive between the paper or paperboard layer and the aluminum foil wholly or at least partly melts and the bond between the paper or paperboard layer and the aluminum foil is thereby weakened.

Since the packaging blank 13 includes aluminum, the bond-breaking heating may be readily realized by induction heating of the aluminum foil with the aid of conventional induction heater elements which rapidly heat the packaging

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blank to a temperature corresponding to or slightly exceeding the melting temperature of the relevant sealing plastic.

As was described previously, the packing and filling machine 14 may also include an applicator (not shown) in association with or immediately after the confetti-removing apparatus 17 in order to apply a separate opening strip or the like over the exposed end of the partly provided emptying hole. Alternatively, the packing and filling machine 14 may include an apparatus (not shown) for applying a water-repellent impregnation agent for covering and protecting the exposed fibre incision edges within the regions of the above-mentioned emptying holes.

Finally, the packing and filling machine 14 may also be equipped with or connected to an apparatus (not shown) placed at the discharge end of the packing and filling machine and with which separate opening arrangements may be applied on the finished packages over the (possibly covered) emptying holes prepared in the package wall.

Suitable opening arrangements for this purpose are previously known to persons skilled in the art and occur in a multiplicity of different forms and configurations. Each type of such opening arrangement capable of facilitating puncturing and/or removal of the arrangements sealing the hole, including the aluminum foil, may be employed in the present invention.

With reference to Figs. 4 and 5A-5C, one particularly preferred embodiment of the method according to the present invention will now be

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described in connection with a packaging blank of a laminated packaging material with the structure which is schematically shown in Fig. 4. The same reference numerals as previously employed have been employed for the same or corresponding components in Figs. 4 and 5. However, in certain cases lower case letters have been added after the reference numeral in order to designate separate parts of the relevant components.

Fig. 4 thus schematically shows a cross section of a sheet- or web-shaped packaging blank of a laminated packaging material carrying the generic reference numeral 13. The packaging blank 13 includes, in this example, a paper or paperboard layer 13a and outer, liquid-tight coatings 13b and 13c on both sides of the paper or paperboard layer 13a. Between the paper or paperboard layer 13a and the one outer plastic coating 13c, the packaging blank has an aluminum foil 13d which serves as oxygen gas barrier and which is bonded to the paper or paperboard layer 13a by means of an interjacent layer 13e of sealing plastic or adhesive of known type. The paper or paperboard layer 13a further has decorative artwork 13f of printing ink which is covered by, but visible through, the outer plastic coating 13b on the other side of the packaging blank 13. While not being particularly shown in Fig. 4, the packaging blank 13 is moreover provided with the desired pattern of crease lines which facilitate folding, and also process-related control markings, so-called bar codes, in register with the printed decorative artwork.

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A web-shaped packaging blank 13 with the structure illustrated in Fig. 4 is processed according to the preferred embodiment of the present invention in the manner which is schematically illustrated in Figs. 5A-5C for producing packages provided with opening arrangements of the type which has an emptying hole prepared in the package wall through which the packages are intended to be emptied of their contents.

The web-shaped packaging blank 13 is unwound from a magazine reel 13" placed at the packing and filling machine 14 (Fig. 3), and is led to a laser apparatus 16 which directs a laser beam 20 (Fig. 5A) of adjustable wavelength and intensity at the one side of the passing packaging laminate 13 in order to cut an incision along a line corresponding to the desired opening contour of the emptying hole in the package wall. By the correct setting of the wavelength and intensity of the laser beam 20, the laser beam 20 burns or cuts through the outer plastic coating 13b and the paper or paperboard layer 13a down to, but not through, the subjacent aluminum foil 13d. Such apparatuses equipped with adjustable laser beams are well-known to persons skilled in the art and are not likely to need any detailed description here.

The thus incised packaging blank 13 is thereafter led further to the confetti-removing apparatus 17 (Fig. 3) where those parts 21 of the packaging blank which are defined by the incision lines 22 are removed by suction or drawing off by means of vacuum (schematically illustrated by arrows in Fig. 5C) for the formation

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of emptying holes 23 partly through-going in the packaging blank 13 and closed from beneath by the intact aluminum foil 13d of the packaging blank 13, including the outer plastic coating 13c.

In order to facilitate and make for a reliable removal of the parts 21 from the packaging blank 13 by suction or drawing, the packaging blank is heated immediately prior to or in connection with this suction or drawing operation, as illustrated in Fig. 5B, by selective induction heating by means of induction heater elements 24 which heat the aluminum foil 13d directly to a suitable temperature for melting or softening the layer 13e of sealing plastic or other suitable adhesive. As a result of this induction heating, moisture present in the packaging blank (moisture content of approx. 5-7%) is forced down towards the aluminum foil, where the moisture reverses and, by a so-called blistering phenomenon, assists in releasing the confetti fraction 21 from the packaging blank 13.

The combination of laser cutting and removal by suction or drawing during simultaneous heating of the packaging blank within selected areas in the method according to the present invention enjoys the unique advantage that it may be applied on a running packaging web without requiring any complicated extra equipment for guiding the cutting laser beam in register with the pre-printed decorative artwork and the crease lines of the packaging blank. Moreover, it ensures an efficient and rapid processing of the packaging web at the same time as it has an inherent ability to be able to be adapted for accommodating varying types

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and configurations of emptying holes while in ongoing operation, without the packaging web needing to be stopped or operation otherwise needing to be disrupted for such a switching operation.

It will thus be apparent from the foregoing description that the present invention satisfies the previously established objects and needs and makes for the production of packages provided with emptying arrangements in a simple, efficient manner using existent conventional equipment. While the present invention has been described in particular with reference to a packaging blank including an aluminum foil serving as a gas barrier, the present invention is naturally not restricted exclusively to such packaging blanks. Instead of an aluminum foil, the packaging blank could just as well include a coating of aluminum applied by vacuum deposition. To a person skilled in the art, it will further be obvious that other metals than aluminum may also be employed as gas barrier in the packaging blank, without departing from the inventive concept as this is defined in the appended Claims.

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WHAT IS CLAIMED IS:

1. A method of producing packages (15) provided with an opening arrangement and of the type which has an emptying hole (23) prepared in the package wall and through which the package is intended to be emptied of its contents, the method comprising the steps of coating one side of a web of paper or paperboard (13a) with a liquid-tight coating (13b) of plastic, and the other side with a foil (13d) or coating of metal which serves as oxygen gas barrier and which, by means of a layer (13e) of scaling plastic or other suitable adhesive, is bonded to the paper or paperboard web; of making emptying-preparatory holes (23) in the thus coated paper or paperboard web and thereafter reforming the packaging blank (13) provided with the holes into individual packages (15) provided with opening arrangements, characterized in that the emptying-preparatory holes (23) are made only partly through the coated paper or paperboard web (13) from one side of the web by first cutting or burning incisions (22) in the web along substantially closed lines in correspondence with the size, configuration and placing of each respective emptying hole (23) on the finished packages (15) through the outer plastic coating (13b) and paper or paperboard layer (13a) down to, but not through, the subjacent metal foil (13d) or metal coating, and thereafter removing the parts (21) of the packaging blank located inside the incision lines (22) for the formation of the emptying holes (23) which, from the other side of the web, are still closed by the unruptured or intact metal foil (13d) or coating.

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2. The method as claimed in Claim 1, characterized in that the parts (21) of the packaging blank (13) located inside the incision lines (22) are sucked or drawn away from the packaging blank with the aid of a vacuum.
3. The method as claimed in Claim 1 or 2, characterized in that the packaging blank (13) is heated selectively within the regions of the parts (21) defined by the incision lines (22) immediately prior to and/or in connection with these parts being removed from the packaging blank (13).
4. The method as claimed in Claim 3, characterized in that the selective heating of the packaging blank (13) is realized by inductive heating of the metal foil (13d) or coating in the packaging blank.
5. The method as claimed in Claim 3 or 4, characterized in that the packaging blank (13) is heated to a temperature at which the layer (13e) of sealing plastic or other adhesive wholly or at least partly melts.
6. The method as claimed in any of the preceding Claims, characterized in that the packaging blank (13) is cut by means of laser (20) of adapted wavelength and intensity in order to cut down to, but not through, the metal foil (13d) or metal coating of the packaging blank.

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7. The method as claimed in any of the preceding Claims, characterized in that the packaging blank (13) is provided with separate pull-off opening strips above the partly provided emptying holes (23), before the packaging blank (13) is reformed into packages (15).

8. The method as claimed in any of Claims 1 to 6, characterized in that the produced packages (15) are provided with separate opening arrangements on the outside of the packages in the region of the prepared emptying holes (23).

9. A package (15) provided with an opening arrangement and of the type which has an emptying hole (23) prepared in the package wall, through which the package is intended to be emptied of its contents, characterized in that the package is produced from a packaging material comprising a layer (13a) of paper or paperboard which, on the outside of the package, has a liquid-tight coating (13b) of plastic and, on the inside of the package, has a metal foil (13d) or coating serving as oxygen gas barrier, and that the emptying hole (23) prepared in the package wall is closed from the inside by the unruptured or intact metal foil (13d) or coating in the packaging material.

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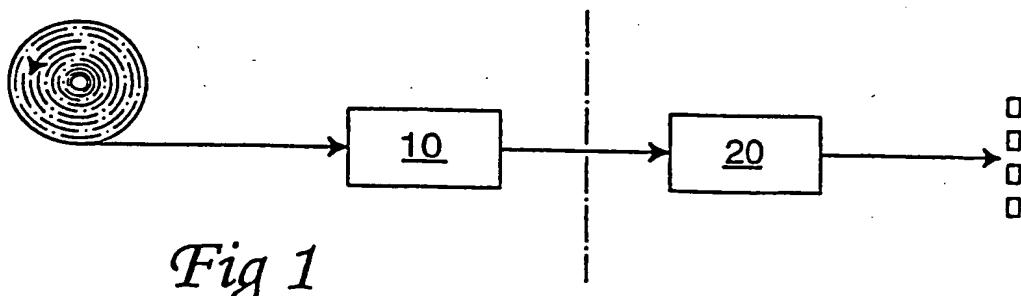


Fig 1

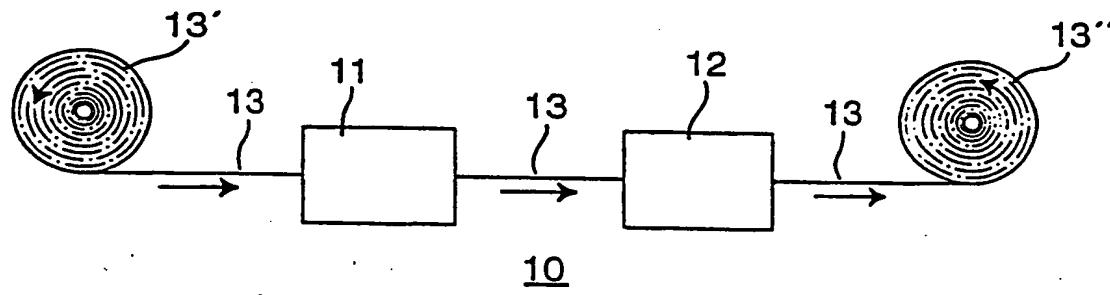
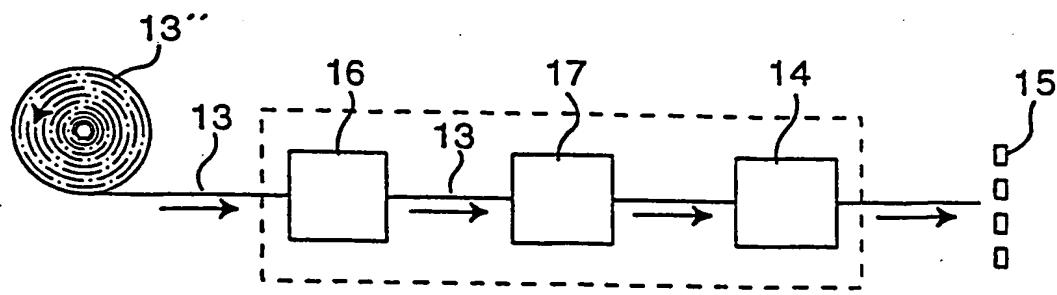


Fig 2

Fig 3  
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APPLN. FILING DATE: MARCH 21, 2002

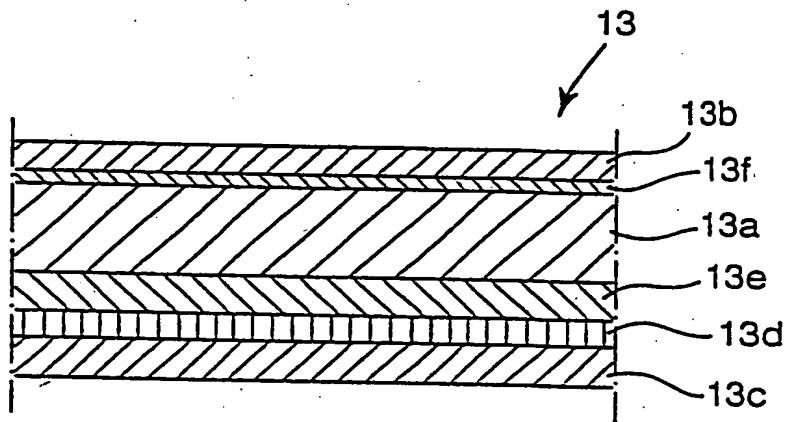
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INVENTOR(S): ROLF LASSON

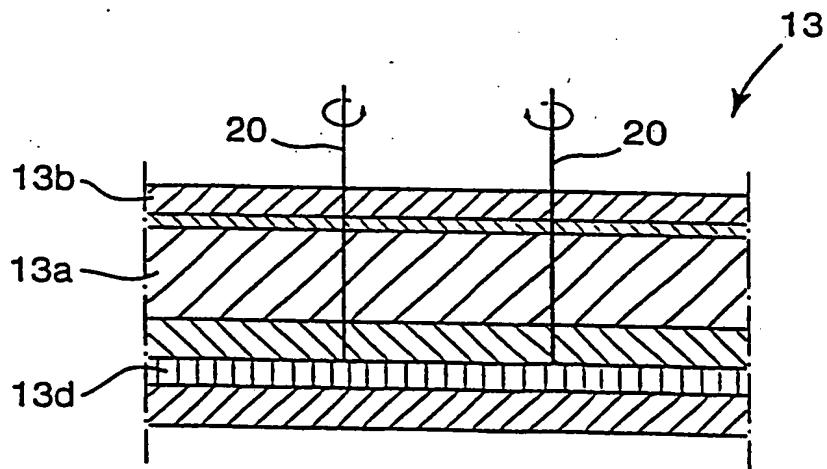
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SHEET 2 of 3

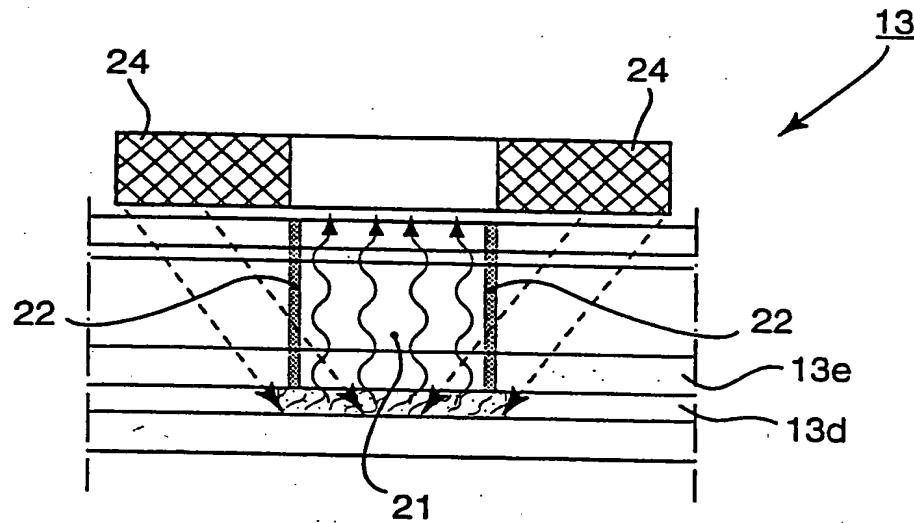


*Fig 4*

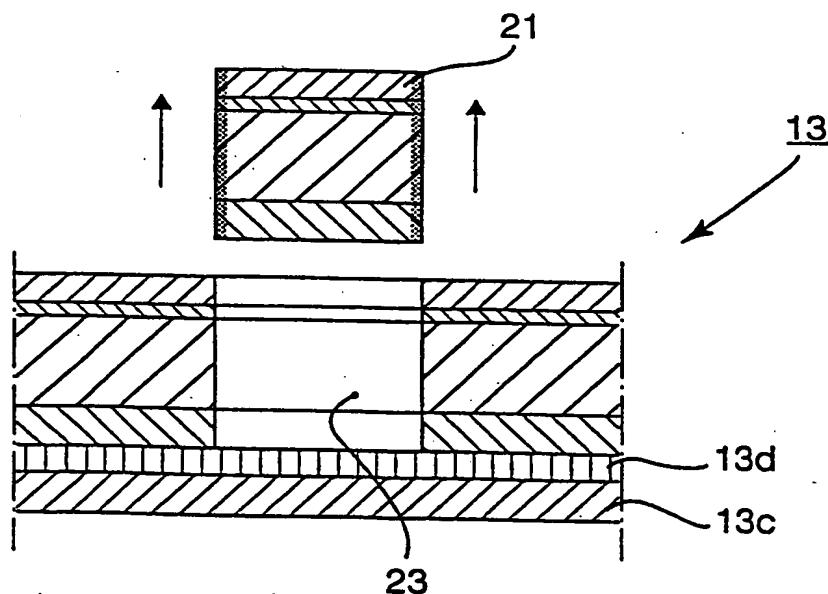


*Fig 5A*

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*Fig 5B*



*Fig 5C*

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